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A
SHORT TREATISE
ON
JURY RUDDERS.

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A

SHORT TREATISE

ON THE METHODS OF CONSTRUCTING

TEMPORARY STEERING APPARATUS

AND

JURY RUDDERS,

BY

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PREFACE.

The Board of Trade having directed that all Candidates for a Master's or First Mate's Certificate of Competency should possess a knowledge of the way in which a vessel that has had her rudder disabled could be handled, and further, how a Temporary Steering Apparatus should be fitted, the following pages have been written under the hope that they may supply plain directions in such an emergency to those who have not personally had such a misfortune to contend against.

Plain detail, rather than terseness or eloquence of language, has been aimed at; and, if my attempt at supplying information upon the important points treated of, tend to assist my brother seamen when such knowledge is most requisite, I shall feel myself amply rewarded.

And now, trusting that my rudder may steer me into the good opinion of those well able to form a practical opinion of its merits, I have the honour to be,

Your very obedient Servant,

H. J. R. LANGDON.

Marine School, Merchants' Hall,
King Street, Bristol.

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ERRATA.

In Plate 3 for Chain Channels read *Main* Channels; Section D, for Fury Rudder read *Jury* Rudder.

ON THE LOSS OF A RUDDER, ITS CAUSES AND REMEDIES.

BEFORE explaining the construction of the different apparatus by which a vessel that has lost her rudder can be steered, it may be advisable to point out some of the principal causes from which this misfortune proceeds, because, acting upon a good knowledge of these causes, may prevent the accident; and most certainly the loss of a rudder is no exception to the good old adage, that "prevention is better than cure."

Firstly, then, there is the danger of having the rudder laid across the stern while there is sternway on the vessel. For illustration: suppose a vessel running across the Western Ocean, from the westward to the eastward, with a fresh S.W. wind and quick sea on, and having all plain sail set; without any warning the wind suddenly veers into the northward, and catches the vessel flat aback; let it now be supposed that the helmsman ports the helm until the vessel loses her headway (which she will do in a comparatively short time) and then starboards, when it gets a little past amidships the sea catches it, and sends the rudder hard a-starboard with a surge; with the officer's attention probably directed elsewhere, the man at the wheel makes, no attempt to regain what the sea and sternway has snatched from him, but quietly "*lets it sweat;*" now the rudder, deriving no support from the wheel chains above by reason of its tiller and chains being in almost parallel lines, the result is that the whole of the strain is thrown on the pintles and gudgeons; it may twist them off at once, or damage them so that they may go at any moment, even in a calm.

Another and more frequent cause of the loss of the rudder may be suggested: suppose a vessel lying-to in a westerly gale on the port tack, with the wind veering to the northward; she has come up to the wind at the same instant that she is struck by a heavy sea on the bow; what with the loss of the wind out of the topsail and the force of the sea, she goes astern with great velocity, throwing the weight of a stern-board on the back of the rudder, thereby running the risk of having the rudder torn from its pintles and gudgeons.

Another danger arises thus: a ship running without sufficient sail on her, or the wind having fallen light after a heavy squall, the helmsman finds that he is about to be thrown over, in consequence of the sea striking the back of the rudder, he lets go his hold of the wheel, which flies across the stern until brought up against the chamfer of the stern-post; whereas, if, instead of letting the wheel go, the helmsman eased it a few spokes through his hands, it would prevent any accident. A similar thing is liable to occur in staying a vessel; while shifting the helm, when stern way is on her, the rudder will often take itself out of the helmsman's hands.

Again, a vessel is lying-to, and, having fallen off, is struck by a sea upon the weather quarter (supposing her to be light), which catches the rudder upon the face, probably snapping the wheel chains, and sends the rudder across the stern with a surge, until it is brought up by the sternpost on the opposite side with such force that it may even carry away the rudder-post; this latter is very likely to occur where there is a slight curve in the rudder-post, as is the case in some vessels.

It is a practice in some vessels when lying-to to heave the helm hard down, rack the wheel chains, and leave one man on deck as a look out; it is not considered requisite to use relieving tackles, but entire trust is put in the wheel chains and its racking; but, should the chain by chance be a little worn, the racking is soon cut through by the sharp edges of the worn portion of the chain, and the result is that the rudder would be playing to and fro across the stern a considerable time before noticed, more especially if blowing very hard. To have a rudder bound taut against the chamfer of the stern-post, as above described, is a practice seamen should abandon; it shows carelessness and want of forethought, because it would almost be found an impossibility to save a rudder so treated should the vessel get sternway, or should a sea catch the back of it.

It may not, perhaps, be out of place to give a few words of caution with regard to the deck being left to the care or charge of one man; he may probably seat himself in a coil of rope dangling from a pin rack, or in some other fashion make himself equally comfortable, and get into a state of semi-stupor; if, when he is relieved, everything is as it should be, it may well be said "all's well that ends well." But, on the other hand, suppose the vessel to be lying-to on the port tack, with the wind blowing from the W.S.W., accompanied with heavy rain, suddenly it veers into the N.W., the vessel, being caught aback, pays off stern-foremost to the sea she was previously facing; while so paying-off a sea strikes her under the counter, or else a wave runs entirely over her, submerging the deck, and carrying away everything before it ("look out" as well), and perhaps a second sea following up the work of destruction the first begun, the vessel founders without a warning to the sleepers below, and, from indiscretion and carelessness, she becomes an addition to that sad record of "vessels that have not since been heard of."

MANAGEMENT AFTER THE LOSS OF A RUDDER.

Having shewn some of the causes of the loss of rudders at sea, the next points for consideration are what is to be done when the rudder *is* gone, and then how its loss may be remedied. Let it be supposed that the rudder is lost and gone entirely from the stern, the first necessity is to keep the ship to the wind; to accomplish this take a spare spar, attach a rope (for towing) to its centre, say with a round turn and half hitch, having the end seized back, drive two or three nine-inch spikes through that part of the hawser that is round the spar, or otherwise lash it, should no spikes be at hand, then take a timber dog (with a ring in it, drive into the end of the spar, bend a line on to the ring of the dog, and stop it along the spar to the bend amidships, (this line is used to haul the spar in, or to slew it end on if required); now everything being ready, launch the spar over the bluff of the weather bow, and, as the hawser is being paid out, stop the tripping line to it; perhaps the easiest and best plan would be to take turns round the hawser with the line, bearing in mind that the stops on the spar must not be of any strength, through its being necessary to break them when the spar is required to be hauled inboard. It will be requisite to have 30 fathoms of scope to the drag, and that it should not be secured further forward than the bluff of the bow, because so securing it is a preventive against the vessel coming up in the wind. It will be necessary, of course, to have some canvass set, not sufficient to drive her ahead, because, in that case, the spar would be brought too far aft, and rendered non-effective. A ballast tub, if well slung and given plenty of scope, might do for a short time in a small vessel.

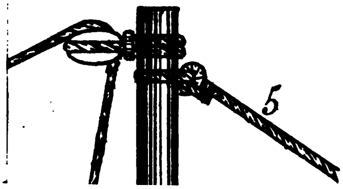
If a rudder is lost while on a wind the vessel might be made to steer herself by keeping the fore-yard braced sharp up, head-sails slightly flowing, and the main-yard checked in about a point and a half; it will be necessary to have the after fore-and-aft canvass well eased off, so that it will shake when the vessel is close by the wind; when she comes up to the wind the main-topsail will shake, and the pressure being all forward, the vessel will necessarily pay off again, until, being met by the main-topsail and after canvass, is prevented from falling off too far; and, so handled, a vessel should not make more than 3½ points leeway.

Should a rudder be lost while running, brace the main-yard forward, on the tack she will best lay-to on, *i. e.*, if the starboard tack, port braces, and *vice versa* if on the other tack; when the wind is brought upon the quarter, brace forward the fore-yard, not too rapidly, but just to keep it slightly on the lift, until the vessel is almost close to the wind, then brace it sharp up. If it be wished to reach, and the wind sufficiently moderate, trim the yards as described above, but if it is blowing too fresh construct the drag.

A sea anchor, under these circumstances, is advocated by some authorities, but when it is borne in mind that a considerable time is necessary for its construction; and that in a case where no measures can be too prompt the spar and hawser above described, being so simple and so easily attainable, will, it is thought, recommend itself to the judgment of most practical men.

TEMPORARY STEERING APPARATUS.

Having now the vessel under control, an explanation must now be given of some simple and effective methods of supplying the loss of the rudder; let the first plan be called a "Temporary Steering Apparatus." For its construction collect together the following articles:—a stout hawser, a pair of chain water-cask slings, two top or sheet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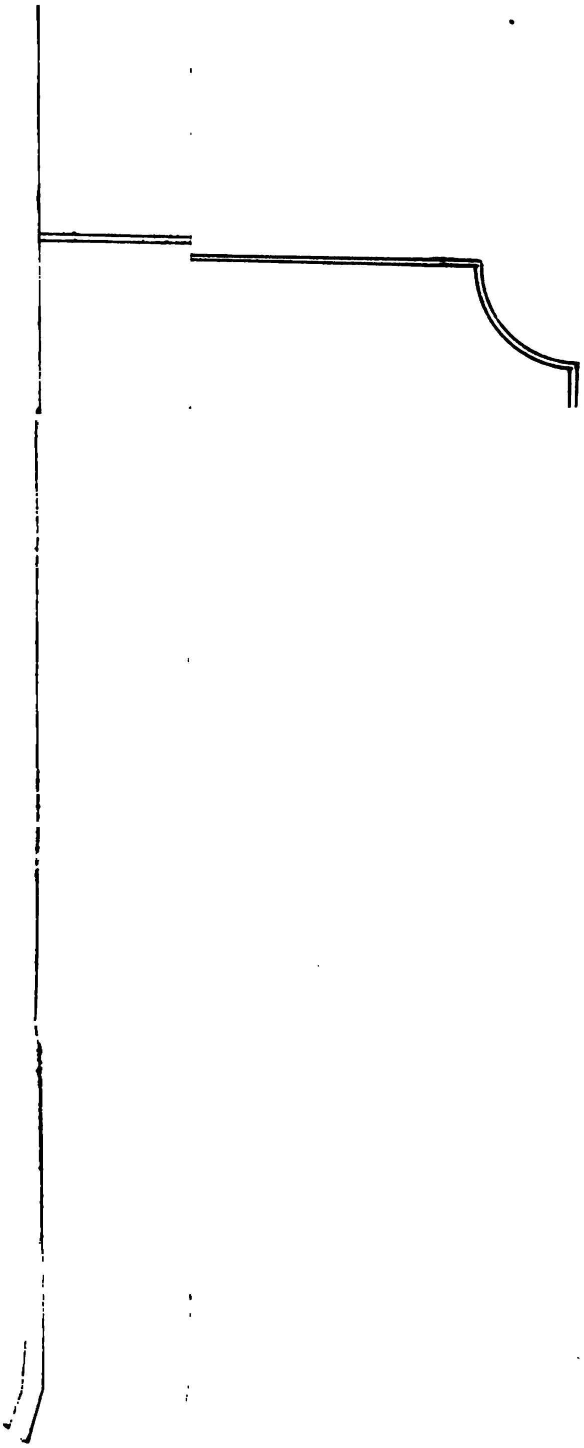
blocks, a stout water cask, about 50 fathoms of lanyard rope, and a spar of sufficient length to project from five to six feet over each quarter. Lash one of the top or sheet blocks above-mentioned to each end of the spar, seizing a couple of stout toggles under their inner shoulders to prevent the wheel ropes from jambing; get a couple of chocks (shaped similarly to a rolling chock) and bolt them to the main rail, a little to the foreside of the barrel of the wheel, as shewn in *Plate* **1**, so that they may serve as saddles for the ends of the spar to rest in, and, should the spar be too slight, it will be necessary to have a guy from either end of it leading forward. Sling the water-cask by means of the chain-slings, rack the rings to the standing part of the chain, and then pass a "snaking" entirely round the cask; parcel and well marl the centre ring of the slings, then, having the end of the hawser parcelled, reeve the end through the ring of the water-cask slings (be very careful of chafe in the way of the ring); now middle the lanyard rope and pass the bight round the barrel of the wheel, after taking the necessary number of turns, reeve the ends through the two blocks at the outer end of the athwartship spars, bending them on about 12 fathoms from the water-cask. When all this is completed, launch the cask overboard, and pay out the hawser until the lanyard or wheel ropes become taut, then secure the end of the hawser to the centre of the taffrail, endeavouring to let the weight of the cask in tow come upon the hawser, so that there may be no strain on the wheel ropes. With such an apparatus a vessel may be steered across the Western Ocean, or even a much longer passage, although it would be prudent that the rackings and seizings be frequently examined.

That the above will answer every purpose required the author can testify from experience. He was serving in a vessel which, when on the banks of Newfoundland, had the misfortune to lose her rudder while lying-to in a heavy westerly gale. The ship in this case was 970 tons register, and, instead of using a spar projecting over the rail, tackles were used at each quarter-piece, the consequence was that although the vessel steered well, yet through the loss of leverage occasioned by the want of the projecting arms of the spar, it required half the crew to work it, a fact that made it all the more fortunate that the vessel was not leaky. The author has found by experiment that a spar on the foreside of the wheel increases the power in the first place, and also gives a fair lead, not only off the bumpkins but on to the barrel of the wheel, so much so that, in strong weather, two seamen are sufficient to steer the ship, a matter of grave importance in a leaky vessel; in addition, it greatly increases the power of making the ship answer her helm quickly, indeed but one more revolution of the wheel is required beyond what would be requisite with a rudder with double wheel chains.

All the articles requisite for the construction of this temporary steering apparatus are to be found in every ship; it could be applied within an hour, unless the tow-rope should unfortunately be stowed in its usual secluded berth; and the knowledge required to put it together is only such as falls within the scope of every seaman, for, although the chocks may be termed carpenters' work, yet they are so



simple that any handy man could make them. To sum up, this Apparatus may be considered as easy, expeditious, and yet so simple that no one can possibly misunderstand it.

Another Apparatus, far more difficult, although not requiring more labour, to steer a vessel when properly rigged, will now be explained: having an hermaphrodite spar aboard, get it with its square end aft, and then bolt short pieces of spar to one side of the after end, until it somewhat resembles an oar, with one side of the blade split off (*Plate* 2, *Fig.* 1), when a sufficient number of pieces have been bolted on to make this blade about two feet in breadth, load the lower edges of it with iron or stream chain, or, in fact, anything which will cause the blade to float perpendicularly; bore holes in the two ends of the spar of a sufficient size to admit the reeving of a 5-inch rope in the after end, and two stout chains through the inner or foremost end. As this inner end will have to rest upon the taffrail a staging of some sort will be required for it to work upon (more especially if the ship has top-gallant bulwarks) a thing which could easily be constructed out of stout planks or spars. As in the other Apparatus, and for the same reasons, a spar is required across the quarter on the fore-side of the barrel of the wheel, through blocks at the end of which the steering lines pass, as shewn in *Plate* 2, *Fig.* 2; but one danger in the use of this Steering Apparatus must be mentioned, and that is, should the vessel get a stern board the guys are liable to be carried away, more especially when there is much rise and fall of sea.

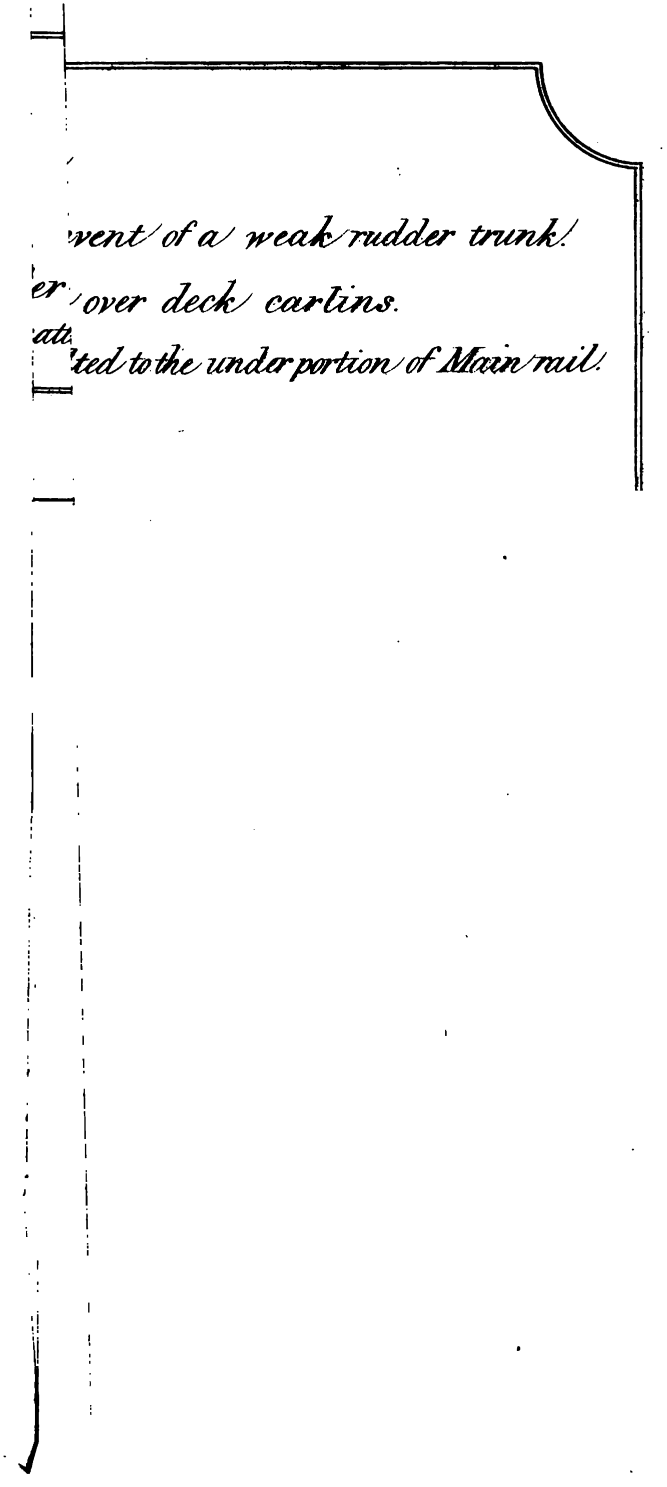
A few remarks must be made respecting a method much quoted among seamen, that of steering a vessel with a length of cable towing over the stern; this may answer well enough in a breeze, but how will it answer when the wind is light? It may be easily imagined that the chain would hang very nearly up and down, and be of little or no service for steering purposes. It is as essential to steer a ship in a light breeze as it is in a strong one, and, therefore, that method which will work under all circumstances, and is the simpliest and easiest made, is evidently the one which should be chosen. The first method described here has all these qualities; as has been previously stated it has been practically tested, and would recommend itself to any thoroughly practical seaman. As is natural with an empty cask it will often jump out of the water when poised upon the crown of a broken wave, and also give unpleasant surges upon the wheel ropes, but these must be borne with, for make-shifts are but make-shifts after all, and perfection must not be expected from them.

Having now disposed of Temporary Steering Apparatus, the next point for consideration will be a more difficult matter still, viz., the construction of a Jury Rudder.

JURY RUDDERS.

The first requisite for this purpose is to select suitable spars, and as the spare ones, if there are any on board, may not be convertible to this purpose, or may be already in use for lashing water-casks, &c., it may be as well to leave them entirely out of the question, and restrict the choice to those in actual use. With different classes of vessels, of course, different spars must necessarily be used; if, for instance, she were ship-rigged, then it would be advisable to take the mizen topmast, topsail-yard, and top-gallant mast; should she be a barque, take the mizen-topmast, mizen boon, and gaff; or if a brig, the main-trysail boom and gaff. Having now the spars at hand, the next point will be to ascertain the length of the rudder post or rudder stock; for this purpose take the staff of a boat-hook or some light spar, and put it down the rudder trunk, so that it may rest upon the top of the figure showing the highest draft aft; while in this position mark where the staff comes in contact with the upper edge of the rudder trunk; let this be measured and added to the number of feet given by the draft from which the measure was taken, and the result will be the length of the stern-post: for example, suppose the greatest draft marked aft to be 18 feet, let the staff be placed upon the top of the 8, and supposing from them to the deck, as shewn by the staff to be an additional 10 feet, it is evident that the length of the rudder-post from the heel to the deck will be 28 feet 6in., and this increased by the distance between the spindle of the wheel and the edge of the rudder-trunk will give the required length, that is, taking the above dimensions, and supposing the last measurement to give 29 inches, the total length of the rudder-post would be 30 feet 11 inches. In ascertaining the length of the rudder head above the deck, it will be necessary to take into consideration the curve of the ship's deck, so that the upper part of the rudder-head shall not be above the level of the lower edge of the main-rail.

Having the two spars selected for the rudder-post and back piece cut to the required lengths, proceed to bolt on a heel-piece (in barques or brigs, when bolting material may be scarce, chain-hooks can be used for this purpose) to connect the rudder-post and back-piece together, that it may form the heel of the rudder, as shewn in *Plate* 3, *Fig.* 2. The heel being bolted, proceed to bolt the upper end of the after-piece to the rudder-post. The frame now being put together cut two large holes in the rudder-post for reeving bridle chains through; one of these holes should be cut through the rudder post about one-third of its length downward from the lower edge of the rudder-trunk, and the other should be close to the heel; it would be advisable to have a piece bolted on to the back of the rudder-post (that is, on the after-side) to strengthen it where it has been materially weakened by cutting the large bridle holes. Next plank up both sides of the rudder-frame, laying the planks horizontally, as shewn in *Plate* 3, *P.* 1 to 2, leaving a little space at the bottom, so that some ballast may be put in at the last moment. This ballast, by-the-bye, may consist of stream chain, pig-iron or shot (although unless used for ballasting boats it is not likely that pig-iron will be obtainable) but a piece of stream chain will mostly be found at hand. The lower portion of the rudder being completed, attention will now be drawn to its head; supposing the vessel to have a rudder trunk large enough to admit the rudder-head without any reduction, round off the lower edge of the head into a somewhat elliptical shape, and then let it be either leathered or matted.



vent of a weak rudder trunk.

er over deck carlins.

att

ted to the under portion of Main rail.

In case the head of the rudder-trunk should be weak, it will be requisite to fit carlins (*Plate* 3, *Fig.* 11); the after ends of the fore-and-aft carlins resting on the beam abaft the rudder trunk, while the fore-ends will rest on the beam to which the sternpost is attached; the two athwartship carlins being bolted to the fore and aft ones, forms a square round the rudder case, and entirely prevents any weight from coming upon its upper edge. Procure a couple of pieces of oak, or other tough wood, of sufficient length and breadth that together they will take the carlins on all sides, having necessarily a half circle taken out of one edge of each to admit the elliptical portion of the rudder-post (*See Plate* 3, *Fig.* 12), let this be called a clamp. Its uses are manifest for by suspending the rudder it becomes a centre for it to work upon, and a means of steadying its head in the rudder case. It has previously been stated that the lower part of the rudder-head should have been rounded off, and then leathered and matted; so also the upper part of the clamp upon which the rudder-head will work should also be treated in like manner, and well greased before fixed into its place. The fid hole, if large enough, and placed fore and aft, will allow the tiller to be shipped in it, and the rudder being now completed, reeve the bridle chains and cross them, that is, take the port chains to starboard and *vice versa*, seizing the crossings with wire, if at hand: their lead and positions being plainly indicated in *Plate* 3, *Fig. C.* It is anticipated further explanation would be unnecessary. To prevent the rudder from jumping up it is recommended to have a spar or stout plank ready for laying across the rudder head, the ends being bolted to the under part of the main rail.

The rudder is now ready for shipping: to accomplish this the vessel will, of course, be laid broadside on to the wind, and consequently as she is driving to leeward it will be requisite to launch the rudder over the weather quarter, previously taking the lee bridle chains, with their tackles attached, to the lee quarter or taffrail, and the weather ones passed along to the weather mizen channels. Reeve a hawser down through the rudder trunk or case, and attach it to the head of the jury rudder, and rig a pair of shears for the purpose of rousing the rudder up through the case.

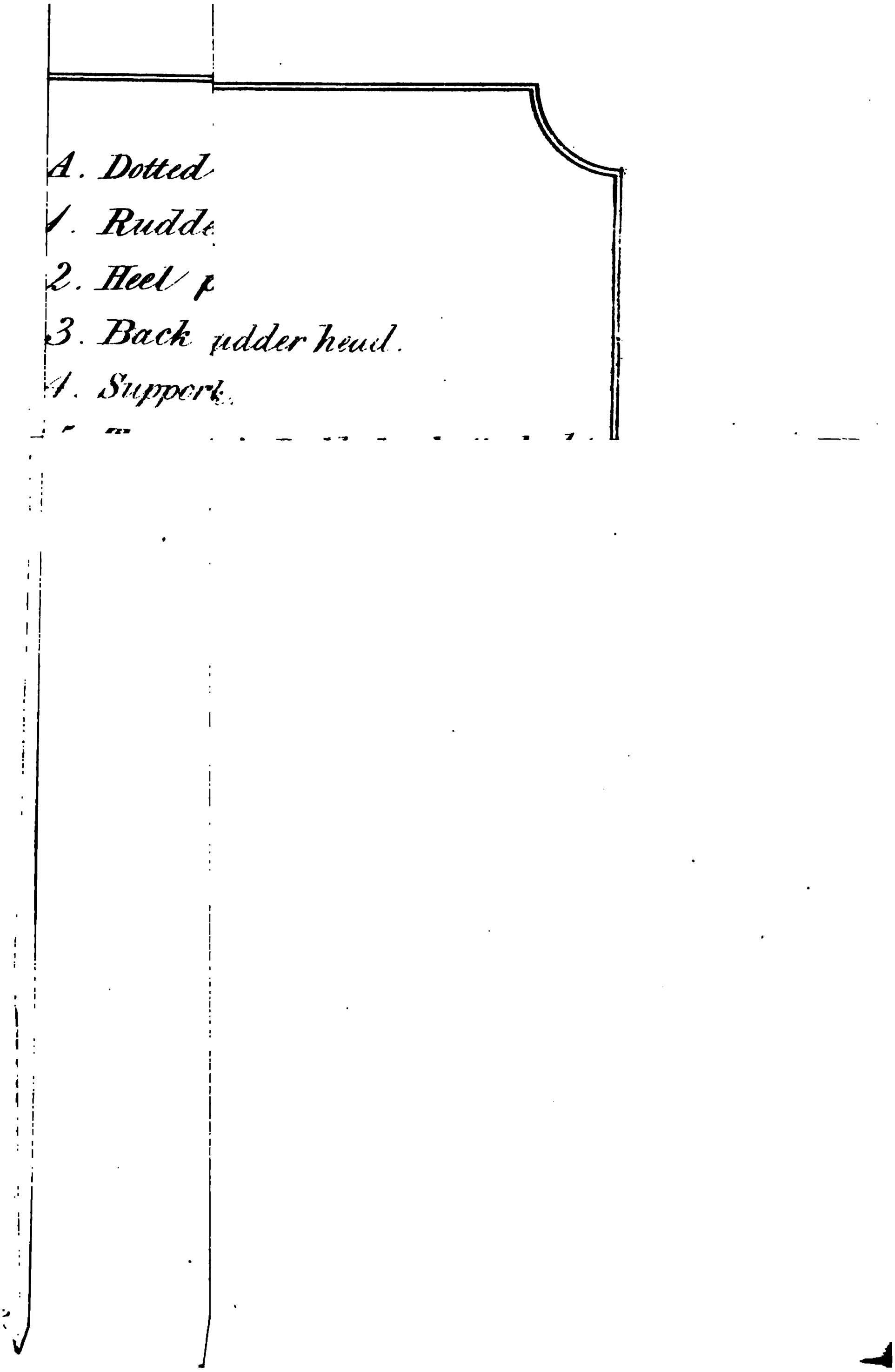
These preparations being completed, launch the rudder overboard, gathering in the slack of the hawser and lee bridle, to prevent the rudder from shooting too far to windward, but on no account permit any strain to come on the weather bridle, because through it the rudder may get into a rather unpleasant position, and from which it would not be easily recoverable. When the rudder-head enters the trunk keep a good strain on the lee chains, and have the upper one taken forward to the place it is intended permanently to fix it, while the lower one is kept for what may be termed a breasting bridle, for the purpose of counteracting the effect of the lee drift. Under the supposition that the rudder is now up through the trunk, ship the Clamp, bolt it, and lower away the rudder, so that it may rest upon it, rouse taut your bridles, and ship the tiller in the vacant fid hole ; it would be recommended to have a good siezing passed round the rudder head to prevent it from splitting from the leverage applied by the tiller; fit the woodlock across the head; it will be perceived by the diagram (*Plate* 3, *Fig.* 6) that the rudder head is rounded to a point, to prevent too great an amount of friction on the woodlock. Before dismissing this section of the subject it may be as well to suppose that sufficient ballast of the kind previously referred to is not procurable; in such a case it would be necessary to drive two large staples into the heel-piece, midway between the rudder-post and back-piece, and they should be of a span sufficient to admit reeving a three-inch rope through them; reeve the two ends of this rope through them, and sling a kedge, crown up, to the bight of the rope, keeping the crown close up under the heel-piece. Now pass a hawser from forward, outside all, and bend it on to the ring of the kedge, so that when the rudder is shipped the rope that hangs or suspends the kedge from the heel of the rudder (the ends of which have made fast to the rudder-head) is slipped, the kedge unreeves it out of the staples and swings forward to the hawser.

Cases may very possibly occur where the rudder case is too small to admit shipping a jury rudder in the manner just described, but the following plan will not only meet the difficulty, but will be also applicable to Iron Ships.

Get two spare spars of such a length that they will reach from the after dead-eye in the mizen channels to about two feet beyond the stern; the after ends are to be secured by lashings through the quarter fair-leads, while the foremost ones are to be lashed round the dead-eye (*Plate* 4, *Fig.* 11.) Next procure a stout spar, sufficiently long that it may be placed athwart-ships, and be secured to the after ends of the two fore and aft spars above mentioned: but, previously to thus fixing it, bolt a chock in the middle of it (*Plate* 4, *Fig.* 15.) The rolling chock from the topsail yard would do; having lashed the spar in the position above described the frame thus made is ready to receive the head of the rudder.

The bridles or chains are to be applied to the rudder in the same manner as described in the preceding method when treating of wooden ships with large rudder cases, but an additional one must be used, which, for distinction sake, can be called the Suspension Chain (*Fig.* 9). This chain is to be rove down through the rudder trunk, or perhaps, better still, attached to the rudder-post and rove *up* through the case, it will then hold the rudder suspended to the stern, and care must be taken that previously to the bridles being hove in taut that the head of the rudder-post is fitted well into the chock (*Fig.* 15) on the athwart-ship spar.

There being no other way to sling the rudder but by a chain so applied, it will be found necessary to have a woodlock to this rudder also, and this can be applied by bolting fore and aft on to the heel of the rudder (of course previous to launching it) a wide piece of wood, and this projecting under the keel would prevent the rudder from jumping up, so that with the suspension chain above, and the woodlock below, the rudder can be kept almost stationary, only bearing in mind that, as in iron ships, with the exception of just at the heel, the rudder would be some distance from the stern-post it would be well to have the woodlock very wide, in case the rudder should *fall to leeward* when the vessel is heeling over.



A. Dotted

1. Rudde

2. Heel p

3. Back udder head.

4. Support

It is hoped that the foregoing different methods have been made sufficiently clear; the explanations could have been more minute, but, with the aid of the diagrams, the practical man can readily supply any petty details, while, had they been given *in extenso*, it may only have befogged the understanding by giving trivial self-evident things an importance they do not need.

Before finally taking leave of this important subject the following cautions cannot be impressed too strongly upon the practical reader:—Never permit a helmsman to put the helm hard up or down while a vessel has stern way upon her: do not allow the helm to be hove hard down when lying-to, because a rudder so bound across the stern has fully one-third less effect on a vessel as regards answering her helm, and, when bound taut against the chamfer of the stern-post, there is no elasticity remaining, should the vessel by any chance get a-sternboard; again, do not allow the helmsman to let the wheel fly out of his hands, or else serious results may follow such carelessness; and, lastly, when in harbour and the cargo discharged, see that the woodlock has received no damage on the voyage just concluded; examine also the pintles and gudgeons. These precautions are easily taken while in port, but, unfortunately, in some inconceivable manner the rudder, which is the second essential of a ship, is completely forgotten in the only place where its safety can be ascertained.

NAVIGATION.

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Local Examiner in Mathematics, Navigation and Nautical Astronomy, to the Society of Arts, London; Nautical Master to the Society of Merchant Venturers, Bristol; Computer of Arrowsmith's Tide Table, &c., &c.

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